ARGUMENTS FOR REQUESTING PRE-APPEAL BRIEF REVIEW

Claims 1-3, 5-19 currently stand rejected as unpatentable over Higgs (2004/0106217)[1] ("Higgs"); claims 14, 15, and 17 currently stand rejected as unpatentable over Higgs in view of Maris (2002/0054295) ("Maris"); and claims 16, 17, 18, and 19 currently stand rejected as unpatentable over Higgs in view of Noguchi et al. (6,730,594) ("Noguchi"). Applicant submits that the rejections lack a factual basis and do not include at least one limitation in the claims.

Claim Rejections – 35 U.S.C. §102

Claims 1-3 and 5-13 were rejected under 35 U.S.C. §102(b) as being anticipated by Higgs. Applicant submits that the present rejection of these claims (1) lacks a factual basis, and (2) fails to present a *prima facie* case.

Lack of Factual Basis

Claim 1 recites "annealing a semiconductor structure to diffuse contaminants from a surface particulate into the semiconductor material". Additionally, independent claim 6 recites "a heating step to the semiconductor to diffuse contaminant from the particle into the semiconductor material.

In the final Office Action dated December 3, 2008, the Examiner argued that Higgs disclosed "annealing" or ("a heating step ... to diffuse contaminant ... into the semiconductor material") in paragraphs 0067-0069, which are related to a "Method for Imaging". As discussed at pages 7- 8 in the Response to Office Action, dated February 3, 2009, which is incorporated herein by reference, Higgs does not disclose "annealing" or heating to diffuse contaminants. Higgs discloses illuminating the wafer with a laser to produce photoluminescence (PL) images. Higgs does not disclose or even suggest that the laser anneals the wafer. For example, Higgs does not discuss a desire or need for annealing the wafer. Higgs explicitly states that the use of the laser is to excite the wafer "from which the average PL signal was calculated. PL maps were obtained." Moreover, Higgs does not discuss whether the laser could possibly heat the wafer sufficiently to anneal the wafer. Thus, there is no factual basis for the Examiner's argument that Higgs discloses annealing (or heating to diffuse contaminants).

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[1] As clarified in the Advisory Action dated February 19, 2009.

In the Advisory Action dated February 19, 2009, the Examiner relies on the theory that Higgs inherently discloses annealing, stating "Higgs excite the wafer/semiconductor to produced photoluminescence, which inherently anneal the wafer/semiconductor." Applicant disagrees and submits that, again, the Examiner's argument is based on a lack of factual basis.

The Examiner provides no basis in fact or technical reasoning to support his statement that exciting a wafer to produce photoluminescence will inherently anneal the wafer. "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy,* 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). MPEP §2112.

Moreover, as stated in In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999), "to establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.'" (emphasis added) (Quoting Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991)). The Examiner is mistaken that the use of a laser to produce photoluminescence will inherently, i.e., will necessarily, anneal the wafer. In fact, Higgs states in paragraph [0001] that the disclosed photoluminescence is "non-destructive". Annealing alters the physical structure of a wafer and therefore would be considered a "destructive" metrology technique. Therefore, it follows that the photoluminescence disclosed in Higgs does not anneal the wafer. At the very least, it is clear error to argue that the photoluminescence disclosed in Higgs must necessarily anneal the wafer and is therefore inherent disclosed.

No *Prima Facie* Case

Claim 1 recites "annealing a semiconductor structure ..." and "after annealing the semiconductor structure, exposing the surface of the semiconductor structure ... to at least one high-intensity beam of light from a suitable light source; collecting photoluminescence produced by excitation of the semiconductor structure by the light beam". Independent claim 6 recites "a second step of collecting photoluminescence produced by like method to the first to produce a second photoluminescence result representative of the intensity of the photoluminescence response as above described after annealing". Thus, the methods of claim

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1 and 6 require separate acts of "annealing" and "after annealing" exposing the semiconductor structure to light and collecting photoluminescence.

In the final Office Action dated December 3, 2008, the Examiner argued that Higgs discloses both the act of annealing, as discussed above, and then cited to Fig. 5 and paragraphs 0045-0046 as disclosing "after annealing the semiconductor structure, exposing the surface of the semiconductor structure ... to at least one high-intensity beam of light". As discussed at pages 8-9 in the Response to Office Action, dated February 3, 2009, the Examiner cited two separation portions of Higgs that describe the same feature, i.e., the laser that produces the excitation light beam which is used for photoluminescence imaging. Accordingly, Higgs does not disclose both "annealing", and "after annealing ... exposing the surface ... to at least one high intensity beam of light".

In the Advisory Action of February 19, 2009, the Examiner cites to paragraphs "00072-0072" [sic, 0073?] of Higgs as disclosing "laser excitation (the process of annealing ...) and contaminated, and then/after the levels of contamination is confirmed, detected or determined for different images, inspection at an increase PL intensity is performed ...." Thus, the Examiner is taking the position that Higgs discloses exciting photoluminescence of the wafer twice: the first time the Examiner interprets as annealing and the second time the Examiner states "inspection at an increase PL intensity is performed". Applicant disagrees with the Examiner's characterization of paragraphs 0072-0073 of Higgs.

Contrary to the Examiner's contention, paragraphs 0072-0073 of Higgs disclose exciting photoluminescence of the wafer only once. For example, in paragraph 0072, Higgs states that a PL map is recorded and "[t]he map is inspected for presence of regions of increased PL intensity observed as white spots or cloudy regions compared to the grey/black "background" Si PL." In paragraph 0073, Higgs states "[s]pots or regions are detected suggesting possible Copper contamination at the image site of increased PL intensity, which are then inspected at high resolution to reveal the nature and location (depth) of contamination...." In other words, Higgs discloses inspecting the map for "regions of increased PL intensity" and inspecting the image "at high resolution". There is no disclosure in Higgs of performing a second excitation at "at an increase PL intensity" as suggested by the Examiner. Applicant submits that the Examiner's characterization of Higgs is not a matter of interpretation, but is a clear error. Higgs does not say what the Examiner suggests it says. Accordingly, a *prima facie* case has not been made.

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Moreover, claim 1 further recites "comparing the result ... to identify unacceptable contamination levels resulting from diffusion of contaminants from the surface particulate into the semiconductor structure". Independent claim 6 recites "a step of comparing the results of each photoluminescence step to determine the difference and obtain an indication of rates of diffusion so as to identify the contaminant." As discussed at page 9 of the Response to Office Action dated February 3, 2009, which is incorporated herein by reference, the Examiner's rejection is premised on Higgs disclosing "inspecting for one or more regions of enhanced PL intensity identifying potential front side or back side diffusable metal contamination; and verifying by additional tests", which is from paragraph 0037. It is important to note that Higgs is attempting to identify "potential" diffusible metal contamination, whereas claims 1 and 6 both address actual diffusion. It is a clear error to read the "diffusion" limitation out of claims 1 and claim 6, and Higgs does not disclose this limitation. Thus, a *prima facie* case again has not been made.

Accordingly, Applicants respectfully submit that claims 1 and 6 are patentable over Higgs. Reconsideration and reversal of this rejection is respectfully requested. Dependent claims 2-3 and 7-13 depend from claims 1 and 6, respectively, and are therefore patentable for at least the same reasons.

Claim Rejections – 35 U.S.C. §103

Claims 14, 15, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Higgs in view of Maris.

Independent claim 14 recites "means to heat the sample under test associated with the support to diffuse contamination from a particulate into a semiconductor structure of the sample under test".

As discussed at page 10-12 of the Response to Office Action dated February 3, 2009, which is incorporated herein by reference, the rejection of claim 14 suffers from the same deficiencies discussed above in reference to claim 1.

Moreover, with respect to Maris, Applicants point out that Maris does not disclose or suggest using the heat source for annealing, i.e., diffusing contamination from a particulate into a semiconductor structure of the sample under test. The sample heat source in Maris is for "temperature dependent measurements". Paragraph 0039. Thus, neither Higgs nor Maris disclose a "means to heat the sample under test associated with the support to diffuse

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contamination from a particulate into a semiconductor structure of the sample under test". Accordingly, a *prima facie* case has not been met.

Thus, Applicants respectfully submit that claim 14 is patentable over Higgs and Maris. Reconsideration and reversal of this rejection is respectfully requested. Claims 15 depends from claim 14 and is, therefore, likewise patentable for at least the same reasons.[2]

Claims 16, 17, 18, and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Higgs in view of Noguchi.

Independent claim 16 recites "heating means to heat the sample in situ, allowing a photoluminescence response to be measured before and after heating, and a comparator to compare the said two photoluminescence responses to determine the difference and obtain an indication of rates of diffusion so as to identify the contaminant". The rejection of claim 16 suffers from the same deficiencies discussed above in reference to claim 1.

Moreover, as discussed above, Higgs does not teach or suggest heating the sample to produce diffusion so that "rates of diffusion" may be determined. Noguchi discloses a heated stage that is only "to control the specimen temperature to 140°" during the measurement of the specimen. Col. 8, lines 30-49. Neither Higgs nor Noguchi teach or suggest measuring the sample **before and after** heating as recited in claim 16. Thus, this claim feature is not disclosed in either reference and therefore a *prima facie* case has not been made.

Accordingly, Applicants respectfully submit that claim 16 is patentable over Higgs in view of Noguchi. Reconsideration and reversal of this rejection is respectfully requested. Claims 17-19 depend from claim 16 and are, therefore, likewise patentable for at least the same reasons.

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[2] Claim 17 depends from claim 16, which was not rejected over Higgs in view of Maris, and, therefore, claim 17 must be considered patentable over Higgs and Maris.